

## Comparing Physics Scheme Performance for a Lake Effect Snowfall Event in Northern Lower Michigan

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High resolution forecast models, such as those used to predict severe convective storms, can also be applied to predictions of lake effect snowfall. A high resolution WRF model forecast model is provided to support operations at NWS WFO Gaylord, Michigan, using a 12-km and 4-km nested configuration. This is comparable to the simulations performed by other NWS WFOs adjacent to the Great Lakes, including offices in the NWS Eastern Region who participate in regional ensemble efforts. Ensemble efforts require diversity in initial conditions and physics configurations to emulate the plausible range of events in order to ascertain the likelihood of different forecast scenarios. In addition to providing probabilistic guidance, individual members can be evaluated to determine whether they appear to be biased in some way, or to better understand how certain physics configurations may impact the resulting forecast.

On January 20-21, 2011, a lake effect snow event occurred in Northern Lower Michigan, with cooperative observing and CoCoRaHS stations reporting new snow accumulations between 2 and 8 inches and liquid equivalents of 0.1-0.25". The event of January 21, 2011 was particularly well observed, with numerous surface reports available. It was also well represented by the WRF configuration operated at NWS Gaylord. Given that the default configuration produced a reasonable prediction, it is used here to evaluate the impacts of other physics configurations on the resulting prediction of the primary lake effect band and resulting QPF. Emphasis here is on differences in planetary boundary layer and cloud microphysics parameterizations, given their likely role in determining the evolution of shallow convection and precipitation processes. Results from an ensemble of seven microphysics schemes and three planetary boundary layer schemes are presented to demonstrate variability in forecast evolution, with results used in an attempt to improve the forecasts in the 2011-2012 lake effect season.